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ABSTRACT

This paper encourages the use of Total Quality Management (TQM) tactics and other strategies as a practical means of fostering a quality culture in institutional research offices of higher education institutions. In particular, four approaches are advocated for understanding and minimizing errors: (1) use of TQM tactical tools to enhance work processes and error trapping; (2) institutional research climate change tactics aimed at error correction, prevention, and quality enhancement; (3) quality promotion tactics for working with external organizations; and (4) national leadership activities for promoting professional standards, developing benchmarks, and offering training for those working in institutional research. Example "bloopers" are used to illustrate errors occurring in institutional research offices and ways to detect or avoid them. (Contains 29 references.) (JB)

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The Error of Our Ways:
Using TQM Tactics to Combat Institutional Research Bloopers

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Abstract

Institutional research offices must produce quality work which is timely, contains zero defects, and is accurate and informative. To prosper under such pressures, institutional researchers must adopt effective strategies to ensure quality. This paper encourages use of total quality management tactics and other strategies as a practical means of fostering a quality culture. Example "bloopers" are used to illustrate errors occurring in institutional research offices and ways to detect or avoid them. Encouraging quality practices in other organizations on whom institutional research offices depend for data is recommended. The role of professional associations in setting standards, providing training, and promoting excellence is stressed. The paper should be of interest to all those concerned with quality institutional research work.

for Management Research, Policy Analysis, and Planning

This paper was presented at the Thirty-Fourth Annual Forum of the Association for Institutional Research held at The New Orleans Marriott, New Orleans, Louisiana, May 29, 1994 - June 1, 1994. This paper was reviewed by the AIR Forum Publications Committee and was judged to be of high quality and of interest to others concerned with the research of higher education. It has therefore been selected to be included in the ERIC Collection of Forum Papers.

Jean Endo
Editor
Forum Publications

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THE ERROR OF OUR WAYS:
USING TQM TACTICS TO COMBAT INSTITUTIONAL RESEARCH BLOOPERS

Errors present an opportunity for professionals to learn about the inner workings of their own office and that of other offices on which they depend for data, projects, or support. They give a window on weaknesses in process, design, or presentation which is concrete and intimately linked to a client's perception of the quality of our work. In this paper, four approaches are advocated for understanding and minimizing errors which occur in institutional research work: (1) use of TQM tactical tools to enhance work processes and error trapping; (2) institutional research climate change tactics, aimed at error correction, prevention, and quality enhancement; (3) Quality promotion tactics for working with external organizations; and (4) national leadership activities for promoting professional standards, developing benchmarks, and offering training for those working in institutional research.

UNDERSTANDING ERRORS

It is almost as difficult to define "error" as it is to define "quality." Definitions of quality have focused on two main ideas: (1) product performance or "fitness for use" (Juran, 1989, p. 15); and (2) customer satisfaction or "meeting customers' needs and reasonable expectations" (Berry, 1991, p. 3). Quality processes are also important in evaluating a product. According to Chafee and Sherr (1992, p. v), " a quality process means that all the steps within the organization's functioning, from beginning to end, work effectively toward the desired goals, with each step adding value."

In the area of professional services, product performance has to be judged in a larger context than the expectations of the customer. The quality of work of a medical doctor, for instance, is normally judged by peer review. Accounting work is judged for conformance with professional standards, such as those of the Financial Accounting Standards Board (FASB). As a developing profession, there are not yet clear standards for work in the institutional research field, but most individuals can recognize and articulate what work is "good" or "substandard". For example, a survey which met the general expectations held by the administrator who commissioned it, could have methodological limitations in its sampling technique which would be viewed as a flaw in the larger milieu of institutional research professionals. So, customer satisfaction alone is <u>not</u> adequate as a monitor of the quality of institutional research work.

If quality can be defined in terms of product fitness, product process, and client satisfaction, what then are errors? In this paper, an error is a product which fails to meet professional standards, has unacceptable process limitations, or is unacceptable to a client for one of four reasons: (1) inadequate conceptualization (understanding of the project goals or research

question was flawed); (2) poor design or method (an ineffective approach was taken to answering the research or project question); (3) flawed process (the strategies, tactics, or procedures chosen to implement the design for the product were flawed); or (4) poor presentation (the presentation or packaging of the product was ineffective).

TOTAL QUALITY MANAGEMENT

Programs for total quality assurance or management (TQM) have been implemented in higher education. Institutions like Oregon State University (Coate, 1990) and Delaware County Community College (DeCosmo et al, 1991) provide examples of major efforts to implement TQM campus-wide. A "full-blown" TQM approach requires extensive training for large numbers of staff and full commitment by top executives of a university or college to make it successful. It can take from 18 to 24 months before any real gains in productivity or profitability are apparent from the commitment (Berry,1991). Specialized TQM teams are often formed to attack specific problems as pilot demonstration projects, but the real goal of all such efforts is to instill a culture for quality within the organization so that day to day work styles and practices enhance quality. Transformation is the goal rather than just quality gains in target areas.

There are two potential barriers to adopting TQM in institutional research offices: (1) lack of institutional commitment to TQM; and (2) size of the institutional research operation. Teeter and Lozier (1991) have correctly pointed out that departments in larger organizations, such as institutional research, can initiate TQM on their own, and that small-scale ground swell efforts may ultimately stimulate a wider institutional adoption of TQM. However, since institutional research offices often depend on services and data from the larger community, lack of external commitment to TQM can limit the effectiveness of a single office adopting a TQM approach. The size of an institutional research operation can also be a barrier to a full TQM effort. In a recent survey of institutional research offices in the Northeast, Volkwein (1990) found that nearly 80% of the 141 offices surveyed had fewer than 3 professional staff. Given the small size and heavy workload of most institutional research operations and offices, TQM is difficult to adopt as a specialized activity requiring extensive staff time. A more practical approach may be to integrate the use of tactical components of TQM into the work styles of institutional research offices. By adopting tactical applications of TQM techniques rather than the more long term strategic deployment of TQM planning, some gains in productivity and quality may be achieved by offices with less investment of scarce time and staff resources. In addition, by teaching and involving staff in TQM techniques, institutional research managers are at the same time fostering a culture of quality. Demonstrating that small scale efforts to improve quality are possible without a major TQM program can have a salutary effect on attitudes and approaches to quality in other offices as well.

INSTITUTIONAL RESEARCH CLIMATE

Ellen Earle Chaffee has pointed out that "quality is a verb not a noun" (Chafee and Sherr, 1992, p. 19) and that quality is not a landmark to be achieved but a process of continuous improvement. Processes within an institutional research office are largely influenced by the institutional research climate, which is a critical factor for work quality. Tagiura and Litwin (1968, p. 11) describe how a person's environment has a large impact on the quality of work being done:

> "The way an individual carries out a given task depends upon what kind of person he is, on the one hand, and the setting in which he acts, on the other. Climate and many related terms such as environment, situation, conditions, and circumstances have been widely used to explain that a person or group can behave in very different ways, even when faced with similar tasks and problems."

Tagiura and Litwin then define organizational climate as "the relatively enduring quality of the total internal environment of an organization that (a) is experienced by the members, (b) influences their behavior, and (c) can be described in terms of the values of a particular set of characteristics (or attributes) of the environment (Tagiura and Litwin, 1968, p. 27)."

Litwin and Stringer (1968) stated the key components of organizational climate as (1) responsibility (degree of delegation experienced by employees); (2) standards (expectations about work quality); (3) reward (recognition for good work versus disapproval for poor performance); (4) organizational clarity (orderliness versus disorderliness); and (5) team spirit (fellowship and trust within an organization). Quality organizations match up on these five points by stressing a high degree of meaningful delegation to employees or "entrusting" (Chaffee and Sherr, 1992), communicating the importance of quality in every part of the organization (Berry, 1991), recognizing and rewarding quality (Winter, 1991), having constancy of purpose (Deming, 1986), and encouraging teamwork (Chaffee and Sherr, 1992).

The institutional research climate can be viewed as a subculture or counterculture within the larger organizational culture of the institution. Institutional research offices do not produce all of their work or their errors on their own; they are part of a larger institutional culture on which the office depends to establish requests and expectations for work, to define norms for work processes, and to obtain information, data and other resources. In addition, offices are part of a higher education community and a polity community in which resources, advice, and practices are shared. Thus, an institutional research office may, on any given project, obtain its data from national resources such as IPEDS, seek advice on methodology over a multi-national electronic network, obtain its analysis from a computer across campus, and prepare its presentation using slides obtained from a company in another part of the country. Communications or exchange with any one of these sources can contribute to quality work or to errors.

BLOOPER COLLECTION

In order to examine the types of errors which occur in institutional research offices, two approaches were used. First, an error log (Table 1) was maintained by four offices for a two month period (two system offices, one institutional office, and one budget office). This log explored the nature, source, discovery, and possible avoidance of errors made within these offices over the study period. Second, institutional research professionals were approached by an electronic mail message, personal contact, and other means for additional blooper examples. Anonymity was assured to all respondents.

The instructions for the error log asked participants to report any error which was not captured by normal error checking procedures. For example, a data entry error would not be reported unless the error was undetected through the normal checking patterns of the office or unless the error survived well beyond the project stage at which it occurred. All errors were reported by stage of work, as follows: (1) project definition (defining the work to be done); (2) project design (the plan for how to do the work); (3) project production (implementing the work plan); (4) project presentation (the form and manner in which the work is delivered to the client); and (5) project evaluation (post-project review of the work). Participants were also asked to describe the stage of work and circumstances under which the error was discovered, the number of days between the error and its discovery, and whether the discovery was made by the institutional research office or an external source. In addition, participants were asked to provide any insights into why the error occurred and how it could be prevented in the future.

The purpose of collecting the errors was to understand in detail how errors occur, are discovered, and avoided by institutional research professionals. Since the sample of errors for the study was not random, generalization of results to other institutional research offices is not warranted. The errors for the four offices participating in the error log, for instance, may be reflections of the manner in which those offices are organized, staffed, and resourced, or of the overall climate of the institutions in which the offices are imbedded. Errors reported by other offices may be unique or memorable errors, which do not occur regularly. The error collection in this study is intended only to provide examples of the types of errors which occur in institutional research offices and to make some suggestions for ways to deal with the types of errors reported.

In all, a total of 51 errors were logged and reported. The errors were classified in the following categories: Conceptual errors (20%), design errors (18%), production errors (59%), and presentation errors (4%). Over 75% of the errors were discovered by institutional research staff rather than outsiders. Of all errors reported, though, nearly half escaped detection until after the project results had left the office.

Table 1. Error Log

Error Study Log Institution: _____ Contact _____
Phone: _____

Error Event							Error Trapping								Error Insights	
		Project Stage						Project Stage								
Date	Description of Error	Definition	Design	Production	Presentation	Evaluation	How the Error Was Discovered	Definition	Design	Production	Presentation	Evaluation	Lag Time in days to Discovery	If Bad/Outsider	Your View of Why the Error Occurred	Future Prevention of This Type of Error

Participants attributed half of all errors committed to problems during production. The specific problems included data entry (34%), data processing or management (31%), spreadsheet manipulation (19%), and computer programming (16%). Causes other than production problems were incorrect assumptions (16%), inadequate training or familiarity with the work being performed (11%), time pressures (9%), poor design (8%), and political factors (6%).

Forty percent of reporters indicated the best idea for prevention of errors was to carry out reasonableness checks of the results being produced. The reasonableness of the data could be verified through either an independent data source or someone with content knowledge of the data or policy area being studied. Improved communication was the next leading suggestion (24%), followed by better training or documentation (17%), improved process design (16%), or policy clarity (3%).

TQM TACTICS

At its core, TQM is a set of analytic techniques for identifying the needs of clients and the means by which the needs can best be met. Thus, TQM is particularly appropriate as a means of addressing conceptual errors in defining projects or process errors in conducting work, which represented nearly 80% of the errors reported. There are many good sources of information on TQM tools. The references by Brassard (1993), Chaffee and Sherr (1992), Stratton (1991), and Bossert (1991) all contain both discussion and examples of TQM tools. Three examples of how to use TQM tools in diagnosing or preventing errors follow:

Example 1: Statistical Process Tools

Bruce Beck, Associate Policy and Planning Analyst, University of Wisconsin, Madison, described a blooper which occurred because of the analysis of results of a survey done on racial climate by a faculty member at another institution. The survey design included deliberate over-sampling of some ethnic groups. The results of the initial analysis showed that UW-Madison's racial climate was rated worse than that of any of the other UW System institutions surveyed. This conclusion was picked up by the Wisconsin State Journal and the Milwaukee Sentinel and thus caught the attention of the Office of Budget, Planning and Analysis at UW-Madison.

In order to examine the study results, Mr. Beck used two statistical process tools: an incidence checklist (Table 2) and a scatter plot (Table 3). These tools enabled him to see that the composition of the study sample was probably responsible for the results. Negative responses on racial climate were more prevalent among minority group members and UW-Madison had a higher incidence of minority respondents to the survey than all other institutions. He showed the study design was at fault in not presenting analyses separately for each category of ethnic status since some categories had been over-sampled. As an alternative, the weight given to responses could have been adjusted before making a summary comparison for racial climate by institution. In this example, the statistical process tools not only uncovered the design error, but also produced a powerful graphic which could then be used in communicating the real meaning of the study data.

Example 2: Process Decision Program Chart

Recently, a discrepancy was noted between state and national data on private high school enrollments for the State of New Hampshire. This discrepancy came to light as part of an effort to create enrollment projections for the University System of New Hampshire. The projections created by the Office of Policy Analysis differed considerably from data reported in a national study. The national study methodology called for using national data sources including the National Center for Educational Statistics (NCES) and the National Catholic Education Association (NCEA) on private high schools whenever state data was either unavailable or exceeded national data by a specific percentage. On the whole, this practice probably enhanced data quality as many states do not collect much data about private schools. The national study staff felt comfortable with this approach because of the high response rates reported by the NCES and NCEA. However, in some states, such as New Hampshire, this practice resulted in greatly over-estimating private school enrollments. The data from NCES

Table 2. Incidence Checklist: Survey Response

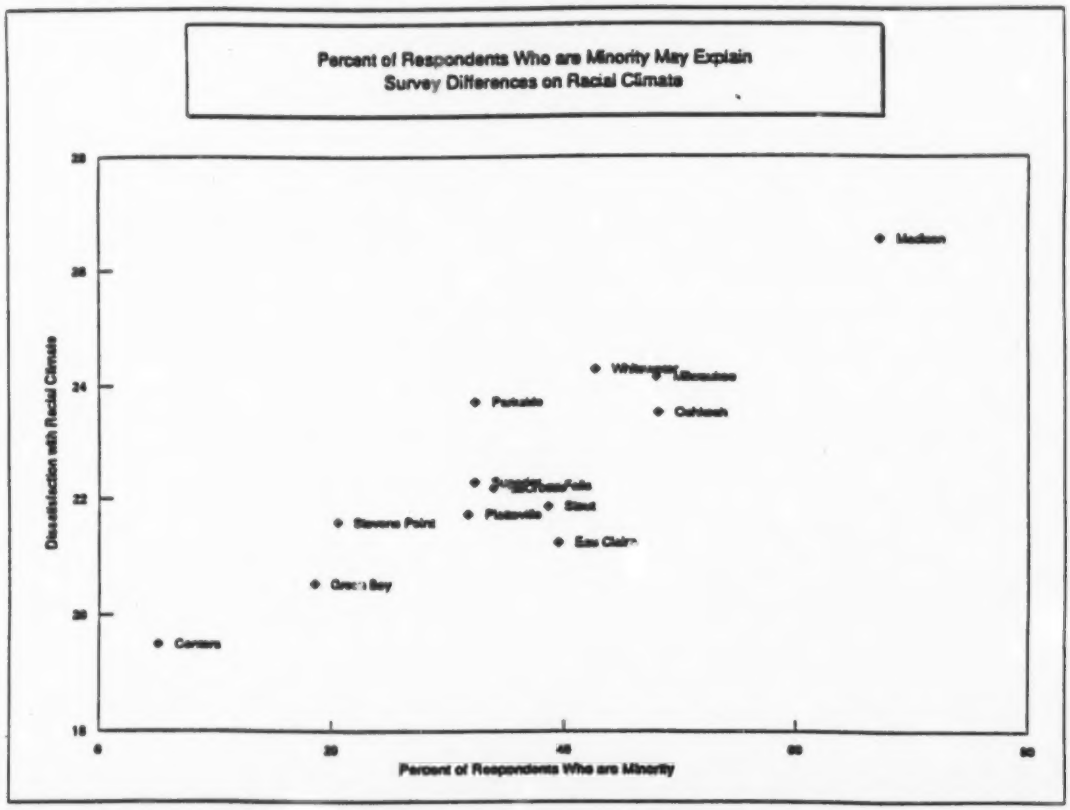
Ethnic Composition of Respondents to Carol Oystar Survey, By UW Institution

Institution	Number of Survey Respondents: Minority	White	Total	Percent Minority
Madison	117	57	174	67.2
Milwaukee	46	50	96	47.9
Eau Claire	45	69	114	39.5
Green Bay	17	75	92	18.5
LaCrosse	38	78	115	33.0
Oshkosh	38	41	79	48.1
Parkside	34	71	105	32.4
Platteville	27	58	85	31.8
River Falls	34	43	67	35.8
Stevens Pnt	14	84	98	20.6
Stout	39	62	101	38.6
Superior	21	44	65	32.3
Whitewater	47	63	110	42.7
Centers	4	74	78	5.1
Subtotal	385	790	1175	33.8
Total	812	537	1349	39.0

Source: Perceptions of Minority and White Students, Faculty and Administrators of Campus Life and Receptivity to Diversity: Final Report, Carol Oyster, Associate Professor of Psychology, UW-LaCrosse, March 1, 1993.

UW-Madison Office of Budget, Planning & Analysis
bdb 06-Jan-94

Table 3. Scatterplot: Response Characteristics and Racial Climate



Source: Bruce D. Beck, Associate Policy & Planning Analyst, UW-Madison Office of Budget, Planning & Analysis
06-Jan-94

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appeared to account for the most variance between population data from the New Hampshire Department of Education and the national study estimates. The New Hampshire Department of Education data for 1989-90 included 162 private schools, with a total enrollment of 18,944. These data were known to represent the entire population since all private schools had to be licensed by the Department in order to operate. Enrollments were reported as part of the licensing process. The NCES data reported on a total of 144 schools, and estimated enrollments at 21,742 students, with a reported response rate of 97%.

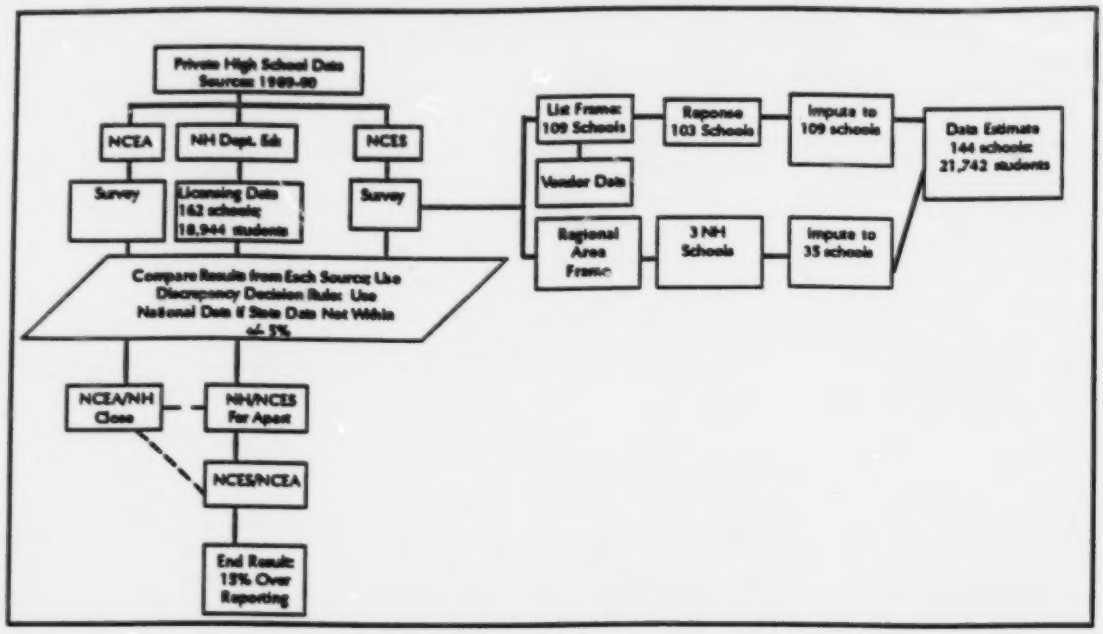
With the help of a Process Decision Program Chart, shown as Table 4, the mystery cleared. The NCES used a list frame of 109 schools (obtained from a vendor, not from the New Hampshire Department of Education) as the basis of the study. Then, a regional area frame sample was used to supplement the list frame. The area frame included two counties from New Hampshire, with 3 schools identified. The data from these 3 schools were then weighted up to represent 35 schools, based on the expected under-reporting from the list frame for the region. Otherwise said, the area frame survey had a standard error of 35 schools! The response rate for the NCES survey was reported as 97%, based on the response rate of the schools identified through the original list frame and the area frame. However, this "97%" response rate clearly did not represent 97% of the private schools in New Hampshire. Only 106 out of the population of 162 schools actually provided data for the survey, for a "real" response rate of 65%. The rest of the data were imputed. (In fairness to NCES, there were clear caveats associated with these data indicating that the data should not be used for state estimates). Enrollments for the NCES survey were over-estimated by 15%, which then affected the validity of all subsequent uses of the data. NCES has taken steps to improve the processes for identifying schools for the list frame, and the national study team is reviewing its use of different data sources.

Use of the Process Decision Program Chart was helpful in this example in three ways: (1) the chart specified the way in which the data estimates had been made; (2) decision rules and their consequences were clarified; and (3) the chart enabled clear discussion of process improvements for future research.

Example 3: Cause and Effect and Matrix Diagram

During collective bargaining, a dispute arose between faculty and the administrative bargaining team over the accuracy of salary analyses of executive salaries which had been presented by the faculty. The collective bargaining team assumed that the faculty had included data for the wrong data year, since the data included both salaries and some non-salary benefits. A response to the union report was prepared under that assumption. In reality, the budget office of the institution had prepared an earlier report which showed both salary and non-salary amounts as "salary". The confusion had resulted since a policy change had recently been made

Table 4. Process Decision Program Chart: Private School Enrollments, 1989-90



concerning executive compensation. Non-salary benefits which were specific only to principal administrators (PAs) were being rolled into salary over a two year period. The union had used the data from the budget report as the source for its own analysis.

A modified cause and effect chart was constructed to identify factors which could have caused the problem, shown in Table 5. The form of the cause and effect diagram was adapted to better suit the institutional research environment. Categories were included for both process and cultural causes. The process category was broken down into definition, design, production, presentation, and evaluation causes. The cultural category included experience, standards, polity, resources, and communications. Using this chart, the main factors explaining the salary reporting problem were identified as policy concerns. For the data year in question, two different methods had been used to calculate salaries, one showing salaries only, and one showing salaries plus the non-salary benefits. The policy inconsistency on salary reporting was directly linked for the confusion over the source of the union's salary figures for executives.

To further clarify the reporting issues, a matrix diagram (Table 6) was used. The diagram showed there were at least three different offices, under two different administrators, which were involved in producing salary reports. Documenting which offices and people needed to be informed of, or involved in, the policy decision spotlighted the need for additional communication links to avoid the problem in the future.

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Table 5. Cause and Effect Chart on Salary Reporting

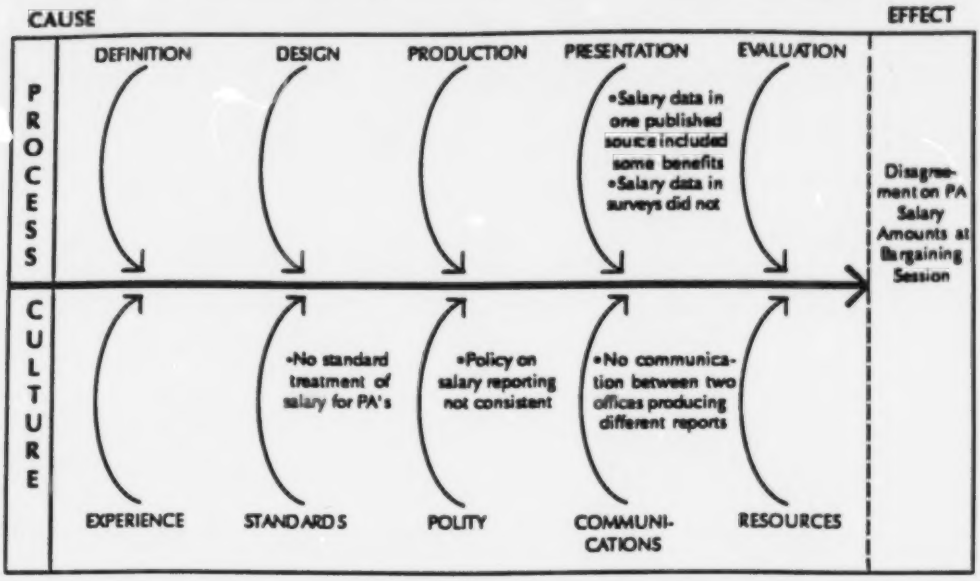

Table 6: Matrix Diagram on Salary Reporting

Task \ Individual/ Departments/ Other	BOT	CEOS	HR Officer	Planning Officer	IR Officer	Budget Officer	MIS Staff	HR Staff	Budget Staff	Collec. Bargaining Team	IR Staff
Policy on salary definition	●	●	●	●	⊕	⊕	⊕	⊕	⊕	●	⊕
Establish report goals			●	●	∅	∅	⊕	∅	⊕	●	⊕
Operationalize salary definition					●	●		●			
Produce reports							●	●	●		●
Report approvals			●	●	∅	∅				●	
Report distribution			●	●							
Policy communication			●	●	●	●	⊕	⊕	⊕		⊕

● Primary responsibility ∅ Secondary responsibility ⊕ Need-to-know

CLIMATE CHANGE TACTICS FOR INSTITUTIONAL RESEARCH OFFICES

Climate change in the institutional research office is the best long term strategy for quality improvement. Many aspects of climate change can be incrementally encouraged by managers. Three tactics are recommended: (1) systematic emphasis on quality; (2) use of Quality Action Questions; and (3) error analysis.

Systematic Emphasis on Quality

Teeter and Lozier (1991) have emphasized the need to be systematic and scientific in the approach to institutional research work. They recommended the use of modeling of work flow, TQM tools, and attention to problem identification and analysis. Heverly (1993) described how to apply TQM to the daily operations of institutional research staff, recommending the use of flowcharts to identify and display steps in regularly scheduled projects, documentation of work requests, and encouragement of a Kaizen (or quality-oriented) attitude. The use of the Shewhart "Plan-Do-Check-Act" cycle was recommended by McLaughlin and Snyder (1993) in their discussion of the organization of institutional research offices, projects, and activities.

The common theme of all these researchers is to systematically apply standards, techniques, and processes which emphasize quality. Whatever strategies or techniques are adopted should be used consistently, communicated clearly, and become part of the office reward structure.

Quality Action Questions

Nearly 60% of the errors reported were not caught before being passed on to the next stage of work. This indicated the need for a tool or strategy to help catch errors during the work process as they occur, rather than later. A Quality Action Questions (QAQ) Checklist (shown in Table 7) was created for this purpose. Ideas for specific questions came from the blooper reports as well as from the general TQM literature. These questions can serve as a checklist for reviewing work at each stage of a work process - project definition, project design, project production, project presentation, and project evaluation. Two additional sections are included, one for working with external data sources and one for project debriefing, or those activities related to the close or "putting to bed" of a project. The QAQs imply and insure greater team and client involvement in all phases of the project work cycle. The advantage of using a quality checklist of this nature is the emphasis on quality during all stages of a research project, not just in evaluating the final product.

Error Analysis

Although it is always better to build quality processes than to spend time finding or inspecting for errors, much can be learned from each error which occurs. It is important to establish a non-threatening environment for the discussion of bloopers. Deming (1986) called this removing

Table 7. Quality Action Questions (QAQs) Checklist

Project Definition 1. Do all parties agree on the definition and scope of the project? 2. Have all relevant areas been involved in the project definition? 3. Do all parties understand and agree to the project timetable and resource requirements? 4. Is there a clear outcome or product defined for the project? Presentation format? 5. Do all parties agree on the outcome or product for the project? Its presentation format? 6. Are the needs of the audience for the product understood?
Project Design 1. Has relevant work of other researchers been identified and reviewed? 2. Do all members of the production team understand and agree with the study design and method? 3. Have all data resources been identified and accessibility checked? 4. Can the design produce a reasonable answer to the project question? 5. Will the design produce the agreed-upon product in an efficient way?
Project Production 1. Is the sequence of activities needed to produce the product clear and do-able? 2. Is the project schedule realistic for the production team? 3. Are all resources needed available for production? 4. Do intermediate project results pass a reasonableness test? 5. Do I get the same results using an independent data source, process, or method?
External Data Resources 1. Do I know all of the assumptions built into the data? 2. Have I provided a clear statement of the definition and format for the data being requested? 3. Will the data be delivered on a compatible medium? 4. What procedures were followed by the data source in handling missing or incomplete data? 5. Have the data been verified by the data source before deliver[illegible]?
Project Evaluation/Review 1. Is the conclusion reasonable? 2. Is the conclusion reasonable to someone familiar with the content area? 3. Is the conclusion consistent with historical data? 4. Is the conclusion consistent with what others have found doing similar work? 5. Is the conclusion consistent with results from related areas?
Project Presentation 1. Have the clients reviewed and approved a draft of the presentation product? 2. Have audience requirements for the product presentation been met? 3. Has the presentation been pretested on site (if involving media)? 4. Is the presentation clear and understandable? 5. Are visual or other media used appropriately in the presentation?
Project DeBriefing 1. Have all files, resource materials, and databases been put into a maintenance state? 2. Have any insights for improvement been identified and recorded for later work? 3. Has the client been asked for an evaluation of the project? 4. Have you toasted or roasted the project in good humor and prepared staff to move on? 5. Have you thanked all those who contributed to the project?

"fear" from your organization. As long as fear prevails, team members will not be able to fully participate in any improvement process, especially one focused on a potentially sensitive area such as errors. Some ideas for desensitizing the process of discussing errors include: (1) being honest and open about your own errors; (2) communicating that errors generally flow from work processes, not from the failure of an individual to do work well; (3) stressing that all members of a team "own" an error which occurs; (4) routinely using a team approach to examine and unravel the causes of error; and (5) stressing that errors are an opportunity for making change and improvements.

Errors can also be analyzed by individuals on their own. Keeping an error log can serve to focus thinking about the causes of an error. Individuals can use the log, or a similar tool, in an entirely private way to examine and understand their own errors. Team discussion is more likely to result in process improvements for the entire office, though, since individuals generally have to work with and depend upon others to complete a complex project.

QUALITY PROMOTION STRATEGIES FOR EXTERNAL ORGANIZATIONS

Institutional research offices are very dependent on the data quality of other offices. Nearly half of all errors reported occurred because of a data quality lapse or operating assumption in an office external to the institutional research office. There are two types of common situations which can result in difficulty with external data: (1) sensitivity problems with national or regional studies; and (2) local data administration problems.

Sensitivity Problems With National or Regional Studies

Studies where an organization reports data for an entire region or country can be subject to sensitivity problems. In such studies, operating assumptions are made concerning missing data, which data sources to use, and data imputation which can markedly affect the accuracy of data for a particular state or institution.

An example of an imputation problem was shared by Mark Chisholm, Senior Information and Research Officer for the Colorado Commission on Higher Education. In reporting on Fall Enrollment data for 1992, NCES imputed all unknown data on ethnic status into the five known ethnic categories, excluding the non-resident alien category. With respect to the Colorado data, NCES matched back to the wrong total, thus resulting in an error of as many as 500 students at one Colorado school. Mr. Chisholm questioned both the procedural error which had been made, and the underlying assumption that students in all ethnic categories were equally likely to not respond to a question about ethnic status.

Since we all depend upon the results of large scale studies, it is worth exploring and understanding the types of assumptions which have been made by the study directors and how

those assumptions may affect the results for your particular state or institution. Imputation practices should be based on supporting research rather than historical practice.

In almost all cases, sensitivity about the reasonableness of study results and the meaning of particular data will be better for those closer to the data than for those organizing data on a national basis. With national studies, decisions made in the course of compiling the data can not be too "particularistic" or driven by the unique needs of one or more states or institutions. Yet, some national studies protect against errors in local data by building in a feedback loop for an institution (or state) to sign off on data accuracy. The American Association of University Professor's annual salary study, managed by Maryese Eymonerie Consultants, is a notable example. Such a practice would have avoided the data errors described in this paper on enrollment projections and ethnicity reporting. In the absence of a feedback loop, it is often possible to receive copies or files of the data specific to your state or institution after the study has been released. While this is too late to prevent errors, following up on any discrepancies or problems seen can help prevent future errors. Most study leaders are very interested in such follow up questions and will work with institutional researchers to resolve problems in the future.

Local Data Administration Problems

In the absence of a clear data administration function on a campus, the value placed on particular data by different organizations may vary. Often members of institutional research offices care more about certain data elements than staff in other offices do. For example, at one institution, the Institutional Research Office used class codes in doing enrollment projections. In one year, the Registrar's Office, which "owned" the class codes was involved in a major software implementation. Since the class codes were not needed for any operational purposes in the Registrar's Office, maintenance on the field was not done for the year. As a consequence, the enrollment projections being created were wrong. In a similar example, the Institutional Research Office of another institution had been working on a housing study for married students. The proportion of married students appeared to be rapidly declining over the previous five years, a revelation of some alarm since the purpose of the study was to project needs for new student housing. On investigation, the reason for the decrease was that the Graduate School had stopped collecting data on the marital status of students, but had not removed the data element from the database. The "decrease" was actually caused by the graduation or attrition of those students for whom data had been previously captured!

Several strategies can be used to promote better data administration: (1) communicate carefully about the data you are using from each source; (2) spend some time getting familiar with the people and data management practices at each organization which vendors data to your office; (3) create a data sharing committee to review practices and policies concerning data

maintenance, access, and use within your institution; (4) promote the need for data administration in the form of either a position or an organized work group at your institution; (5) promote training for all those managing data on which you depend (even if you have to offer the training yourself); (6) build partnerships with other organizations who provide and use the data on which your office depends; and (7) promote better understanding of data quality issues among the leaders of your institution.

NATIONAL LEADERSHIP ACTIVITIES

While individual institutional research offices are primarily responsible for achieving quality work in their own institutional setting, professional organizations such as the Association for Institutional Research (AIR) and The Society for College and University Planning (SCUP), can promote quality in three ways: (1) developing standards; (2) conducting benchmarking studies; and (3) organizing and providing professional training.

Standards

AIR members have recently developed a code of ethics about the way in which we go about our work, but there are few real standards in place for what we do. A recent study by a state higher education commission provides an example of how methodological standards could facilitate policy analysis and discussion. Table 8 shows an analysis by the commission on faculty workload. The analysis reported the number of faculty and current number of courses taught at each public institution in the state system. The conclusion of the analysis was that the public institutions in the state would be able to teach nearly 4,000 additional courses without any funding increase, or that the institutions could cut roughly 550 faculty systemwide without a drop in service to students. Caveats were included in the report about the need to collect additional data on faculty workload. Officials of the higher education system in the state responded (prior to the study's publication) that the study did not take into account class size, type of course, course credits, course discipline, or level of instruction, and thus did not present an accurate assessment of actual workload for faculty. The commission published its results without modification. In this case, both the commission and system organization believed their operationalization of faculty workload to be appropriate. In the absence of methodological standards for research on faculty workload, no agreement was reached on the issue of interpretation of data. Consequently, no common base of understanding was developed which could frame discussion of the larger policy issues on workload. It is critical to have well-defined methodological standards for research in areas where a public policy debate is engaged. Otherwise, neither the general public nor policy makers are positioned to both understand and debate solutions to problems.

Table 8. State Commission Analysis of Faculty Workload

Core Faculty 1991-92 Current Versus Potential Courseload					
Carnegie Class.	Total Core Faculty	Current Course Load	Potential Load Increase*	Potential Course Load	Pct. Inc.
Research I					
A	1,052	3,684	1,737	5,421	47%
Research II					
B	271	1,155	314	1,469	27%
Comprehensive I					
C	82	603	80	683	13%
D	222	1,579	268	1,847	17%
E	189	1,355	194	1,549	14%
F	437	2,905	704	3,609	24%
G	118	597	351	948	59%
Comprehensive II					
H	94	600	175	775	29%
I	55	404	63	467	16%
Total	2,520	12,882	3,886	16,768	30%

* Assumes the 1991-92 core faculty number and a standard courseload of eight courses a year at comprehensive institutions and five courses per year at the research institutions.

AIR has sponsored some focused work on research standards. For example, the Data Advisory Committee of AIR has worked on reporting standards for the Student Right-to-Know and Campus Security Act of 1990. There are models for how to begin developing a broader code of written standards. The government, accounting, and business officer associations such as The National Association of College and University Business Officers (NACUBO) have developed standards for financial management. NCES (1992) has recently published extensive statistical standards for research. These standards cover planning and testing, contract management and operations, statistical processing procedures, data provisions and analysis, reporting, and evaluation and documentation for surveys.

Many other professions have in place formalized review or certification structures based on peer review. Examples are the accreditation reviews of academic programs or financial audits of business organizations' practices. Lack of formal standards hinders the professionalization and limits the respect given an emerging field such as institutional research. A voluntary

accreditation or certification process might encourage and recognize those offices with high standards for quality. AIR has studied the idea , but is not currently pursuing development of a certification program.

Benchmarking

A related strategy for strengthening institutional research operations could be copied from the latest efforts of NACUBO to benchmark the costs of many operational and administrative services at a variety of institutions. According to Shafer and Coate, "bench marking is an ongoing, systematic process for measuring and comparing the work processes of one organization to another. It identifies 'best practices' that can lead to improvements in operations and customer service." It is a "positive, proactive structured process which leads to changing operations and eventually attaining superior performance" (Camp, 1989, p. xi). The underlying philosophy of benchmarking is captured in the Japanese word "dantotsu" or striving to be the best of the best (Camp, 1989).

Benchmarking protocols or studies could help institutional research offices to gauge their effectiveness on specific tasks and provide a baseline from which to track improvements in quality management and operations. Benchmarking enables an office to gauge its "batting average" against that of other offices (or against itself over time), to identify specific areas for improvement, and to define and measure improvements after initiatives have been taken. Some common activities in most institutional research offices could serve as subjects for benchmarking, including IPEDS reports, the AAUP annual faculty salary survey, or the graduation rate reporting which will be required under the Student Right to Know and Campus Security Act of 1990.

Training

The development of an institutional research curriculum is a third area in which associations could assist professionals in fostering quality work. To its credit, AIR has adopted training as a key emphasis in its strategic planning process. The institute held in the summer of 1993 (and planned for August 1994) is a program designed to meet the training needs of beginning institutional research professionals. According to AIR Executive Director, Terrence Russell, in 1995, the institute program will include both a general institute similar to those offered previously and a new advanced institute. AIR is also developing a program to cost-share training with regional organizations willing to use the training obtained to provide workshops. Other AIR training initiatives include the pre-conference workshops associated with annual meetings, courseware development, and publication of materials such as the planned Resources in Institutional Research series.

CONCLUSIONS

Institutional research offices strive to produce quality work which is timely, contains zero defects, is accurate and is informative. Bloopers reported by institutional researchers were analyzed and used as examples to show four different approaches to preventing errors: (1) using total quality management tools to diagnose and prevent errors; (2) promoting a quality culture in institutional research offices through systematic emphasis on quality, use of Quality Action Questions, and error analysis; (3) encouraging better data management and administration in offices external to institutional research; and (4) providing leadership through activities of national associations to set standards, provide training, and promote excellence. Institutional research does not occur in an organizational vacuum. Quality improvements depend partly upon the ability of the individual office to design and produce good work, and partly on the existence of a quality culture in the immediate environment and the larger professional milieu.

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